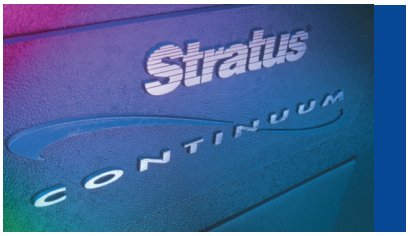
The world is a busy place.

It never stops.



NEITHER DO THE SERVERS

THAT KEEP IT RUNNING.

Stratus®

THE WORLD'S MOST RELIABLE SERVERS

When business demands continuous availability, it demands Stratus servers.

Ian McLelland,
Head of Technology
Tradepoint

"Trading is easy and reliable with Tradepoint's client-server computer technology. The central order matching system runs on a fault-tolerant Stratus® Continuum® computer, which has given users continuous, 100% Central System availability since the Exchange first opened in 1995."

→ Your enterprise needs its critical applications available when and where transactions are being processed. At the point of sale, the ATM, and the Electronic Communications Network (ECN). On the Internet, intranet, and extranet. Distributed across geographically dispersed locations. And, more and more often, in the most rigorous lights-out computing environments.

More sites, more users, and more customers are connected online around the clock every day. The strain on servers and the applications they support has never been greater. Continuous uptime has become a business mandate. For online banking, electronic commerce, and 24-hour trading. For booking travel reservations to and from every time zone in the world. To safely execute the growing number of Internet-based transactions. To support *any* application that requires immediate access by you or your customers.

Your competitiveness and profitability depend on it.

Count on Stratus for the maximum level of systems and applications availability. We design and manufacture the world's most reliable servers. The robust architecture, openness, and simplicity of the Continuum Series promises to make your computing decisions easier and more affordable than ever before.

Continuum Series 400

→ **HP-UX® OS**

Continuous availability in an entry-level system with the lowest total cost of ownership in the marketplace.

Continuum Series 600

→ **HP-UX OS or VOS**

High-performance midrange systems that provide open, continuously available computing for distributed and departmental environments.

Continuum Series 1200

→ **HP-UX OS or VOS**

The growth path and expandability that users demand in a high-end system built to handle large online transaction processing (OLTP) applications.

The Stratus Continuum family combines HP® PA-RISC®-based symmetric multiprocessing (SMP) technology with a proven continuously available architecture. Continuum's processing power, guaranteed availability, and choice of hardened operating systems are designed to support critical online applications.

Continuous availability has always been our singular focus.

Which is why we do it better than anyone.

Jean-Paul Coucault,
IT Systems Manager
Chronopost

"The data carried on our network is constantly changing and is used only for a short period of time. This is what Chronopost has to safeguard in shipping its 120,000 pieces of mail and parcels daily. Stratus fault-tolerant servers guarantee us high levels of system security and service continuity."

→ Since day one, continuous availability has been the primary focus of everything Stratus does. All of our engineering research and development efforts are dedicated to making Stratus' hardware and software platforms the most reliable and available in the industry.

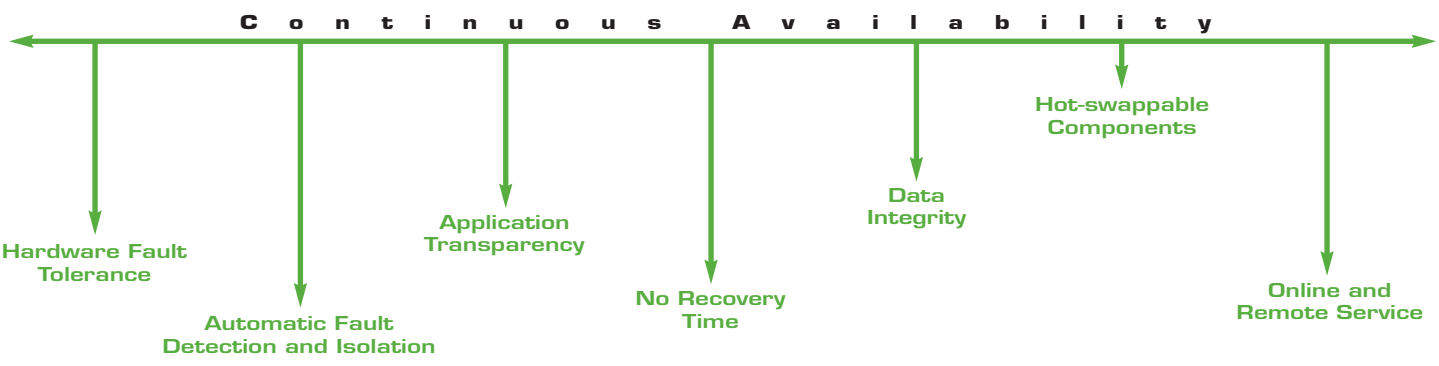
Every aspect of system design is viewed from the availability perspective. The result: literally hundreds of features required to make a continuously available system — from duplexed hardware, to transparent mirrored disk support, to operating system kernel hardening, to onboard diagnostics and repair, to user-replaceable components.

These availability innovations are engineered right into your system. Stratus' hardware-based fault tolerance requires no additional configuration, administration, or special programming. Benefits like maximum applications uptime and data integrity are immediately yours, right out of the box.

We complement robust reliability with industry-leading serviceability for your mission-critical environment. Our servers feature fault detection and isolation capabilities; maintenance software that monitors the status of all system components; diagnostic links between every Stratus system and our Customer Assistance Centers (CACs); and automatic phone-home capabilities that allow the system itself to report problems and initiate parts shipments.

We also introduced strategies that allow users to easily replace or upgrade system components online, without experiencing even a second of downtime. It's as simple as sliding a board or a component suitcase in and out.

Continuum's robust architecture allows us to offer the strongest availability guarantee in the industry — 100% uptime on hardware and system software.

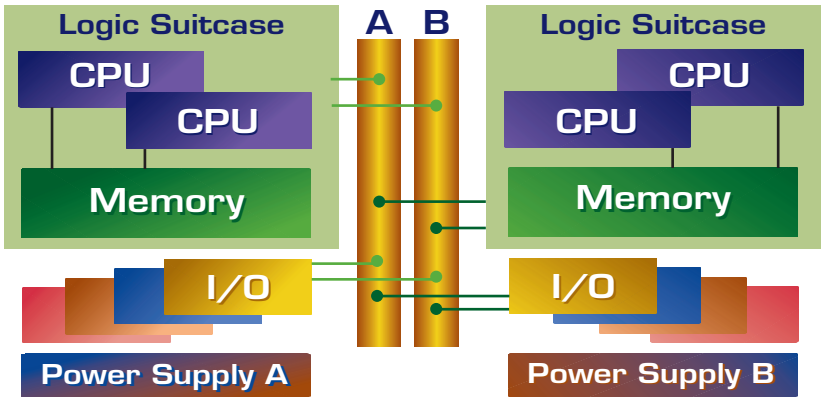


Our approach to availability begins with an innovative fault-tolerant architecture.

→ The elegant simplicity of the Continuum Series is no accident. We designed these machines for customers who need a user-serviceable system built to withstand the most demanding on-location and lights-out computing environments.

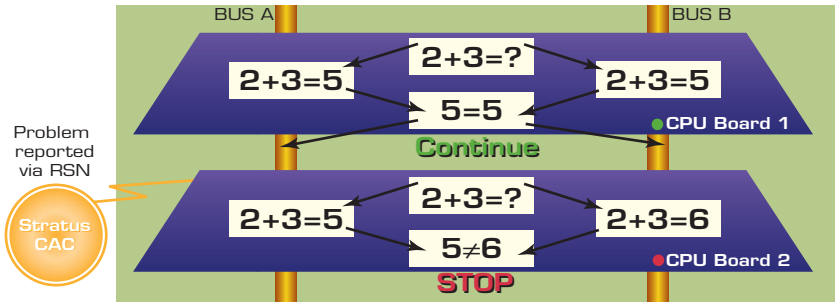
Pioneered by Stratus, this hardware-fault-tolerant architecture offers major advantages over clusters. Because the duplexed components are running in lockstep, Continuum systems never lose a single cycle. Component failures are instantaneously identified and isolated. Should a failure occur, system performance remains unaffected. All memory contents and disk-based information are preserved. With Continuum, your data integrity is assured.

Duplexed Components Running in Lockstep



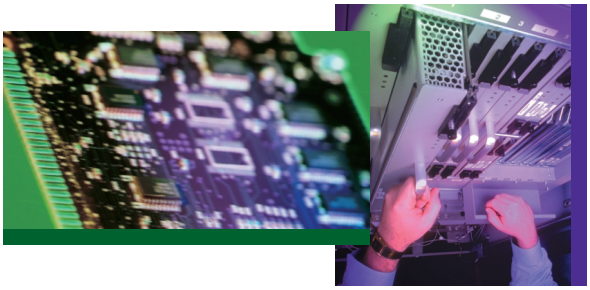
Stratus fault tolerance begins with the system's duplexed architecture. Major components — CPUs, memory boards, input/output controllers, buses, power supplies, and fans — are duplexed and run in lockstep, functioning as a single logical entity. If a component fails, its partner simply continues processing.

Self-Checking Logic and Lockstep Processing



Continuum's diagnostics detect and isolate potential problems before they affect server operation. Working in lockstep, each circuit board checks itself for hardware errors at every machine clock cycle. If a logic fault is detected, the faulty board stops instantly and reports the problem to the Stratus Customer Assistance Center (CAC). The partner board continues to execute the program in a normal manner and at normal speed. The application sees only one CPU and remains unaffected by any failure.

Self-checking hardware also guarantees that even transient errors will be identified before any data integrity problems can occur.



Attention to the details

is what makes continuous availability a reality.

Stratus originated this automatic, hardware-based fault-tolerant architecture and continues to enhance its implementation. No other technology can match Continuum's trouble-free set-up, robust processing, and transaction integrity.

→ **Logic Suitcases** — The logic suitcases contain the system's central logic functions — its CPU technology, memory modules, and CPU cache modules. The suitcases work in lockstep as partners, continually processing the same applications and transactions. If any component within a suitcase fails, the suitcase simply drops out of service without any intervention by the operating system. The partner component continues to operate as normal; the system continues to run uninterrupted.

At the same time, the system automatically notifies the Stratus CAC of the problem. Stratus service personnel send a replacement component or suitcase to arrive the next business day. Once inserted, the new part restores itself, resynchronizes with its partner, and continues processing. This procedure takes place automatically without further operator intervention or any system downtime. LEDs on the front of each suitcase continuously display operating status.

Memory Subsystems — The Continuum family also introduces a new memory design, with main memory located on the same board as the CPU for maximum throughput. Memory is duplicated and ECC-protected; memory controller logic is self-checking. Advanced circuitry checks memory for errors, ensuring that seldom-used memory locations do not develop noncorrectable errors. This does not affect the performance of ongoing work.

I/O Subsystems — Redundant lockstep processing is not limited to the processor and memory components of Continuum systems. I/O subsystems are similarly reliable. The Continuum Series leverages protective software as well as redundant hardware for its I/O subsystems. End-users and applications are protected from individual I/O card, I/O bus, and/or communication line failures. Stratus hardens the firmware drivers for each adapter used in the Continuum series. We also add fault-tolerant software within communications protocols where standards allow for the necessary modifications.

CONTINUUM 600 AND 1200 I/O SUBSYSTEMS

Multiple Connection I/O Subsystem — Redundant pairs of I/O controllers are employed to drive specialized I/O adapters (IOAs) across a fault-tolerant I/O bus. IOAs for both local area network (LAN) and wide area network (WAN) connections are available. Each IOA has its own dedicated processor that supports functions such as onboard diagnostics, online board insertion and removal, as well as error recovery. Up to 14 IOAs can reside in an I/O chassis. Up to six I/O chassis can be configured on the high-end Continuum system — for a maximum of 84 IOAs.

The components in our servers create a system unmatched for mission-critical applications.

Mike Ellis,
Information Services Manager
William Hill

"Our Web server is located offshore on the Isle of Man where we do not have the same immediate access to engineers or parts as we do on the mainland. In essence, we wanted a computer that could be plugged in and left alone, one that was not going to give us any trouble."

High-Performance I/O Subsystem — For high-speed connections, Continuum 600 and 1200 systems offer redundant pairs of I/O controllers that connect directly to the main system bus. Two types of high-performance I/O controllers are available: a controller with a Fast Ethernet port and four differential SCSI ports; and a controller with three PCI mezzanine card (PMC) slots which can be occupied by any combination of Stratus-qualified PMC adapters.

CONTINUUM 400 I/O SUBSYSTEM

PCI I/O Subsystem — Without sacrificing reliability, the Continuum 400 series employs an industry-standard I/O bus that offers users both economy and a variety of adapter cards. The Continuum 400 series adds availability protection to its I/O subsystem, yet remains fully compliant with Peripheral Component Interconnect (PCI) standards. Stratus-qualified, off-the-shelf PCI adapters are used to provide WAN, LAN, and storage connections.

Disks — Disks and controllers are also duplicated to prevent any failure from corrupting data or interrupting system operation. Whenever a write operation is requested, the operating system writes the data to both disks. When a read operation is required, it comes from the disk whose read-write heads are closest to the data, minimizing access time and offering performance benefits in read-heavy environments. If a disk failure occurs, all disk I/O operations continue on the good drive until the malfunction is repaired. When the failure is repaired, the system automatically restores the disk. Here again, the application software is unaware of the failure or the redundant hardware architecture.

Power Supplies — Redundant power supplies ensure that your system stays powered up and running at capacity. Power is distributed to the system via two separate paths. Each path can fully support operation of the system in the event the other fails.

Fault-tolerant duplex power is also supplied to the disk drives and system clock. In the Series 400, each power supply also supports one of the system's two PCI card cages, ensuring continued access to redundant PCI adapters in case one of the power supplies should fail.

Only Stratus' fully integrated approach can keep your applications, data, and processing continuously available and free of corruption.

We offer standard 24-hour, 7-day-a-week service.

Which makes it anything but standard.

Mr. Leo Yeung,
EDP Assistant Manager
Fujibank

"Your built-in service capabilities are so efficient that most of our problems have been solved remotely."

Tim Poirier,
Senior Systems Associate
Revlon

"The CAC is unquestionably the best I've ever dealt with. Their response time and follow-through are unparalleled. This is what Stratus is all about."

→ At Stratus there's no need to pay a premium for exceptional service — it's our standard. All Continuum service customers receive 24 x 7 support, remote diagnostics, personalized account management, and access to senior system engineers.

The Remote Service Network (RSN™), built into every Stratus system, forms a continuous direct link between your Continuum system and the Stratus Customer Assistance Centers (CACs). The RSN is the cornerstone of our ability to keep your critical services continuously available and performing at levels that exceed the most stringent customer expectations.

The unique notification and call-home services of the RSN provide you with the ability to operate at full efficiency even in lights-out environments. Maintenance software within the Continuum system monitors and diagnoses all system disruptions. In the case of a transient error, the hardware component automatically restarts. In the event of permanent failure, the part is taken out of service while its partner component continues normal operations.

Simultaneously, the system automatically phones home through the RSN and reports the failure to the Stratus CAC. Available 24 hours a day, CAC personnel will contact you regarding the problem. If further diagnosis is required, they can dial into your system. As a result, most customer problems are solved remotely, eliminating the wait for an onsite visit from an engineer. Should the problem involve a failed customer-replaceable unit (CRU), a replacement part is shipped immediately via express delivery.

These proactive support tools enable us to isolate and correct problems before they negatively impact your computing environment — often before you even realize a problem has occurred.

Combining high technology with around-the-clock access to senior service engineers assures you of unparalleled customer support. It's the way we underwrite your continuous computing availability and satisfaction.

Continuum environments support industry-standard databases as well as a wide range of networking and industry-specific protocols.

Additional features that are packaged with the systems include the RSN, remote console control, duplexed disk storage, and duplexed memory.

→ **HP-UX Operating System** — The Hewlett-Packard HP-UX operating system is available on the Continuum 400, 600, and 1200 Series. The most open UNIX® operating system available in the industry today, HP-UX provides complete Application Binary Interface (ABI) compatibility with other systems running HP-UX.

The HP-UX operating system is an X/Open UNIX-95-branded operating system that conforms to X/Open's Single UNIX Specification, as well as standards that include XPG4, SVID3 Level 1 Application Programming Interfaces (APIs), OSF AES, and de facto SPIs such as BSD. This adherence to standards helps to make the solutions running on top of the HP-UX operating system both portable and interoperable.

Stratus Fault-Tolerant Services — Stratus fault-tolerant services provide the functionality required to manage duplexed processors, mirror disks, and enable online component replacement transparent to the HP-UX OS kernel. Operating at a level below the operating system, these services keep the core kernel independent of the Stratus hardware. They hide the details of Continuum's fault tolerance and redundancy from the upper layers of the HP-UX operating system kernel. As a result, HP-UX users gain all of the benefits of Stratus' fault tolerance through a hardware and software architecture that leaves the core kernel, file system, and shared memory unchanged. These services are completely transparent to users and applications. Developers simply write to the HP-UX API. Off-the-shelf HP-UX-based applications run unchanged on Continuum.

In addition, Continuum users running HP-UX can use standard HP features, such as the Logical Volume Manager (LVM) to provide capabilities such as disk mirroring and striping for applications.

VOS — the Stratus Virtual Operating System — VOS is available on Continuum 600 and 1200 models. VOS, Stratus' multiprocessing operating system, provides power, flexibility, and efficiency in a fault-tolerant environment. This reliable, time-tested operating system combines convenient program development facilities with efficient system and user resource scheduling and allocation, along with system security and networking.

VOS offers a broad range of features to create both a versatile development environment and a highly qualified production environment for commercial online applications. VOS also offers a large address space and a broad range of system services, plus batch facilities and performance analysis tools. User-oriented software facilities provide a comprehensive interface between the operator, application program, and operating system. The VOS command language features flexible, self-descriptive commands, and provides several types of online help services.

Stratus Transaction Processing Facility — The Stratus Transaction Processing Facility (TPF) provides tools for administering a fast, secure, and efficient transaction processing system. TPF, available on VOS, includes subroutines, commands, and administrative requests for multitasking, queuing, and transaction protection. TPF provides complete file protection for transactions, including transactions that involve updates on multiple computer systems within a network. This protection ensures data integrity regardless of extended power failures, application program errors, and operator errors.

Communications and networking software run flawlessly on Continuum servers.

→ Stratus provides industry-standard protocols that offer customers flexibility in implementing their communications and networking systems. Stratus communications software products and networking interfaces offer a full range of functionality, including networking, device emulation, and terminal connectivity, all of which conform to international and de facto standards.

Stratus communications offerings range from ASCII terminal and personal computer connectivity to fully distributed computer networks. Products include SNA, X.25, ISDN and TCP/IP as well as applications-specific protocols for the financial services, retail, and transportation industries. In addition, Stratus supports the Open Systems Interconnection (OSI) model, a blueprint for international connectivity standards.

Stratus LAN support gives Stratus users direct, efficient access to standard LANs, including Ethernet and Token Ring. Stratus systems, operating as LAN servers, provide the fault tolerance required by many network-based distributed applications.

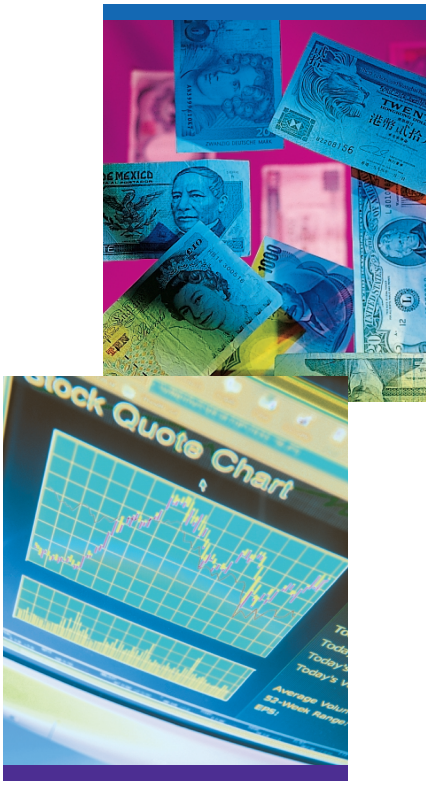
Communications Interfaces

Name	Description	Supported On
Asynchronous Adapters	For connection to multiple asynchronous devices	C400, C600, C1200
Synchronous Adapters	For synchronous connection to a wide-area network such as SNA or X.25	C400, C600, C1200
T1/E1/ISDN PRI Adapters	For connection to network communications over wide-area T1-E1 circuits	C400;* C600, C1200
Ethernet Adapters	For connection to an IEEE 802.3 compliant Ethernet local area network	C400, C600, C1200
Token Ring Adapters	For connection to an IEEE 802.5 compliant Token Ring local area network	C400, C600, C1200
Channel Attach Adapter	Provides high-speed direct connection between a Continuum system and an IBM® S/370 or S/370 compatible host	C600, C1200

*T1/E1 only

Hardware-based fault tolerance vs. clustered system solutions:

An explanation of why Stratus servers beat the competition.



→ Some vendors claim that high-availability clusters are the best option to protect uptime. But for application environments that demand continuous computing, Stratus servers bring you distinct advantages.

Continuous vs. High Availability — High-availability clusters are typically general-purpose computers linked together to provide more availability than stand-alone systems. Consequently, recovery can take minutes to hours when a node in a cluster fails. The initial outage — plus database reconstruction time, lost transactions, and corrupted data — can take a huge toll on customer satisfaction and your bottom line.

In contrast, fault-tolerant Stratus servers are engineered to prevent downtime from happening in the first place. Continuum's duplexed architecture means the spare component is already within your system, working in lockstep with its partner. Even in the face of failure, there is absolutely no recovery time, no loss of memory-resident or in-flight data, and no impact on system performance.

Simplicity vs. Complexity — Implementing a high-availability cluster customarily requires your IT staff to invest significant time to write and test failover and recovery scripts. A clustered environment may also require you to customize your application. But the demands are just beginning. Every change to the cluster's configuration means that the write-test-document cycle must be repeated. And not only is cluster administration complicated and time-consuming, it's also a resource drain that can divert scarce programming talent from delivering revenue-producing applications. All of this adds to your total cost of ownership.

Compare this to the Stratus approach: proactive and preventive availability features already built into our hardware and software. Run your mission-critical applications on a Continuum server. You automatically benefit from continuous availability — so you can deploy critical applications faster and more reliably.

Stratus: The Continuous Availability Advantage

High-Availability Cluster	Fault-Tolerant Continuum Server
Minimizes system outages	Eliminates system outages
Recovery time from failures: minutes to hours	Zero recovery time
Custom scripting required	Application transparency
Disk/transaction recovery model	Protection of memory, communication, and disk state via component replication
Proper sizing required to avoid bottlenecks	No performance impact during outage and recovery
"People-intensive" management environment	Simplicity of management

Continuum servers from Stratus.

The only solution for mission-critical continuous availability.

→ The Stratus Continuum product family is the ideal platform for critical applications that directly affect the well-being of your company and customers. From the ground up, Stratus, the industry leader in automatic system availability, has engineered its Continuum systems to give you:

→ Continuous Processing® for the most rigorous on-location and lights-out computing environments

→ The lowest total cost of ownership in the continuous availability industry

→ The only fault-tolerant HP-UX operating system

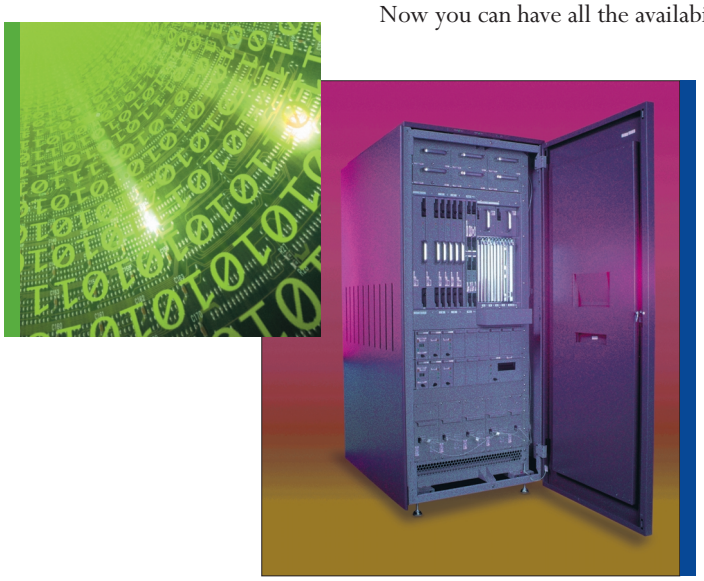
→ Two decades of reliable VOS

→ A host of industry-leading application solutions to ensure compatibility and critical applications uptime

→ Expert, around-the-clock service

→ Continuous availability right out of the box — which means no failover scripting, no systems integration, no special administration, and no loss of critical data.

Now you can have all the availability you need. With Continuum from Stratus.



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